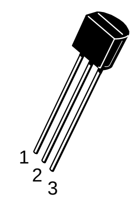
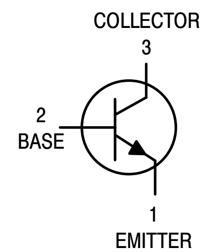
Amplifier Transistors

NPN Silicon

2N5088
2N5089



CASE 29–11, STYLE 1
TO–92 (TO–226AA)



MAXIMUM RATINGS

Rating	Symbol	2N5088	2N5089	Unit
Collector–Emitter Voltage	V_{CEO}	30	25	Vdc
Collector–Base Voltage	V_{CBO}	35	30	Vdc
Emitter–Base Voltage	V_{EBO}	3.0		Vdc
Collector Current — Continuous	I_C	50		mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0		mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12		Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to +150		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$(1)	200	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage(2) (I_C = 1.0 mAdc, I_B = 0)	 2N5088 2N5089	$V_{(BR)CEO}$	 30 25	 — —	Vdc
Collector–Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	 2N5088 2N5089	$V_{(BR)CBO}$	 35 30	 — —	Vdc
Collector Cutoff Current (V_{CB} = 20 Vdc, I_E = 0) (V_{CB} = 15 Vdc, I_E = 0)	 2N5088 2N5089	I_{CBO}	 — —	 50 50	nAdc
Emitter Cutoff Current ($V_{EB(off)}$ = 3.0 Vdc, I_C = 0) ($V_{EB(off)}$ = 4.5 Vdc, I_C = 0)		I_{EBO}	 — —	 50 100	nAdc

1. $R_{\theta JA}$ is measured with the device soldered into a typical printed circuit board.
2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

November, 2001 – Rev. 1

Publication Order Number:
2N5088/D

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Max	Unit
ON CHARACTERISTICS					
DC Current Gain		h_{FE}			—
(I_C = 100 μAdc, V_{CE} = 5.0 Vdc)	2N5088		300	900	
	2N5089		400	1200	
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc)	2N5088		350	—	
	2N5089		450	—	
(I_C = 10 mAdc, V_{CE} = 5.0 Vdc)(2)	2N5088		300	—	
	2N5089		400	—	
Collector–Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1.0 mAdc)		$V_{CE(sat)}$	—	0.5	Vdc
Base–Emitter On Voltage (I_C = 10 mAdc, V_{CE} = 5.0 Vdc)(2)		$V_{BE(on)}$	—	0.8	Vdc
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain — Bandwidth Product (I_C = 500 μAdc, V_{CE} = 5.0 Vdc, f = 20 MHz)		f_T	50	—	MHz
Collector–Base Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)		C_{cb}	—	4.0	pF
Emitter–Base Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)		C_{eb}	—	10	pF
Small–Signal Current Gain		h_{fe}			—
(I_C = 1.0 mAdc, V_{CE} = 5.0 Vdc, f = 1.0 kHz)	2N5088		350	1400	
	2N5089		450	1800	
Noise Figure		NF			dB
(I_C = 100 μAdc, V_{CE} = 5.0 Vdc, R_S = 1.0 kΩ,	2N5088		—	3.0	
f = 1.0 kHz)	2N5089		—	2.0	

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

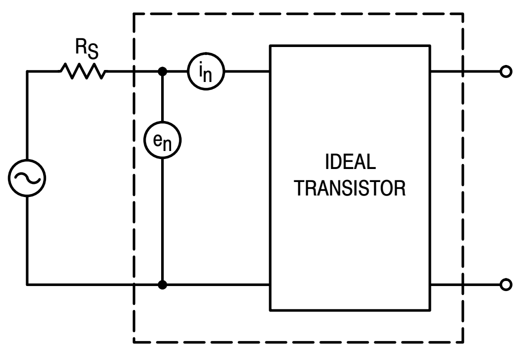


Figure 1. Transistor Noise Model

NOISE CHARACTERISTICS

(V_{CE} = 5.0 Vdc, T_A = 25°C)

NOISE VOLTAGE

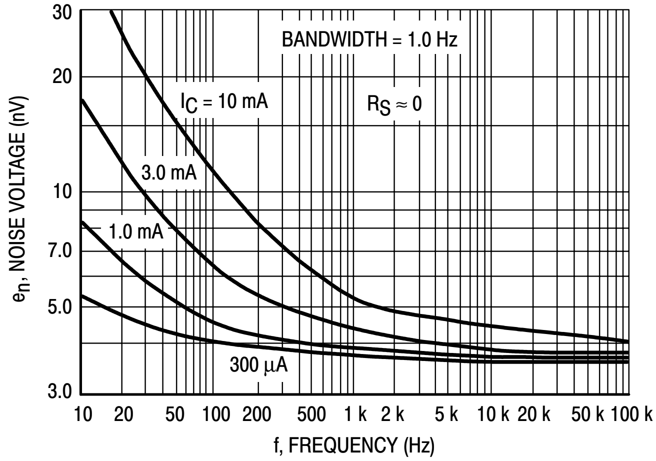


Figure 2. Effects of Frequency

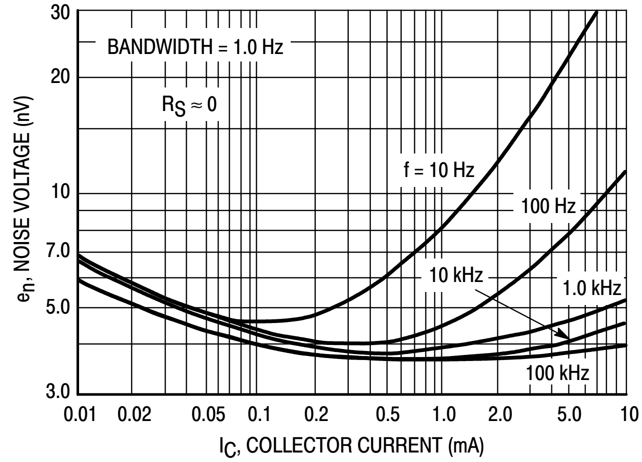


Figure 3. Effects of Collector Current

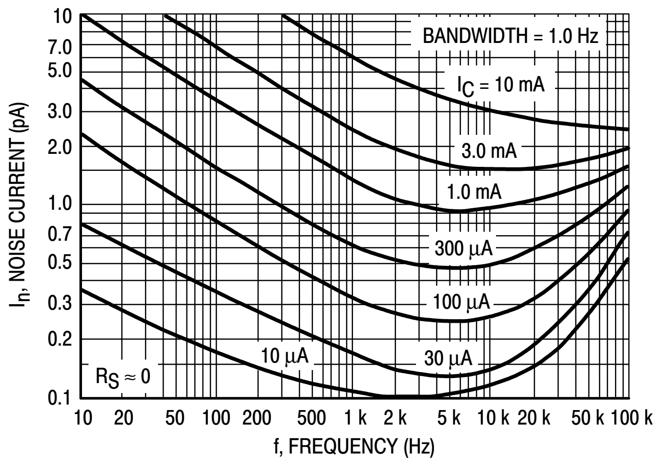


Figure 4. Noise Current

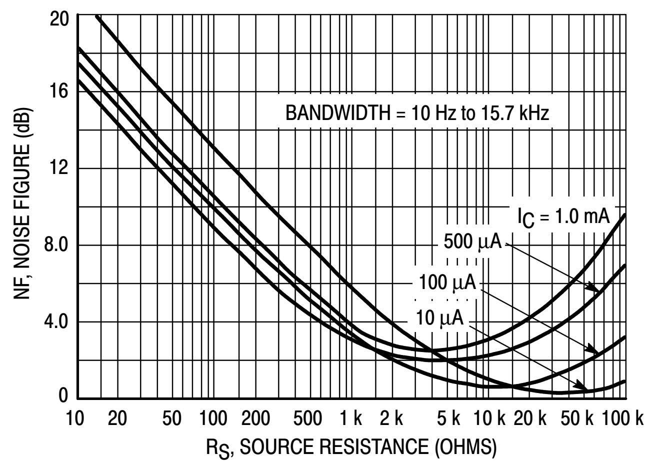


Figure 5. Wideband Noise Figure

100 Hz NOISE DATA

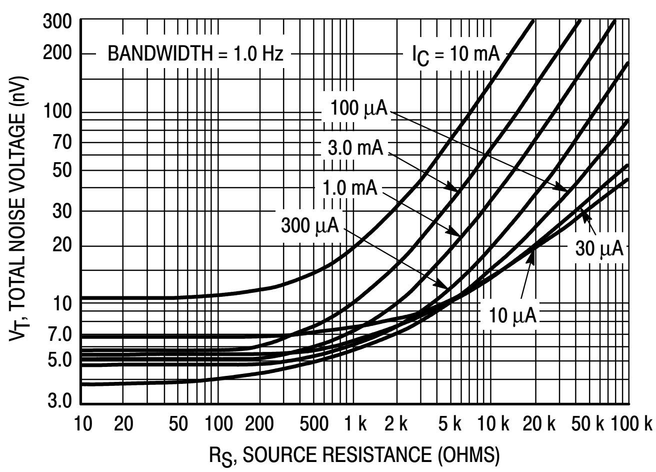


Figure 6. Total Noise Voltage

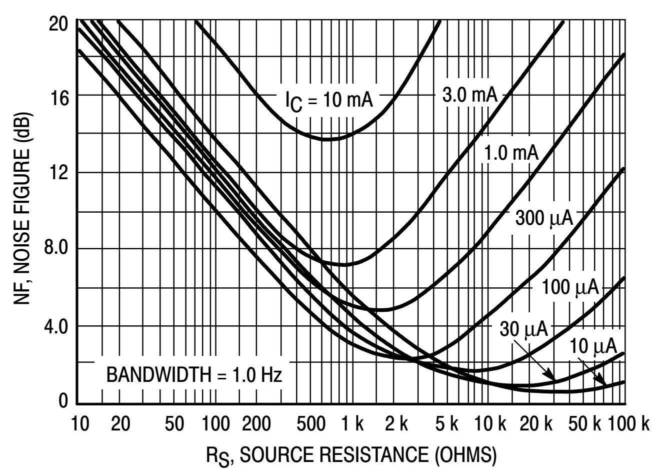


Figure 7. Noise Figure

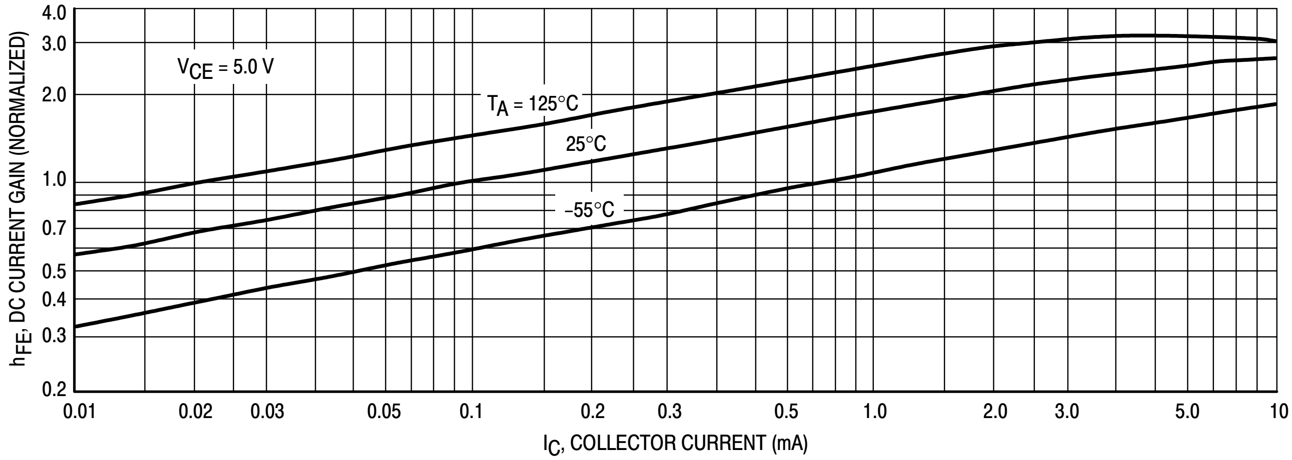


Figure 8. DC Current Gain

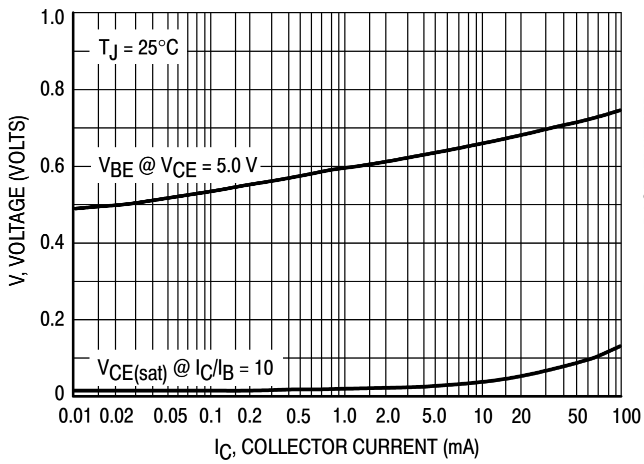


Figure 9. "On" Voltages

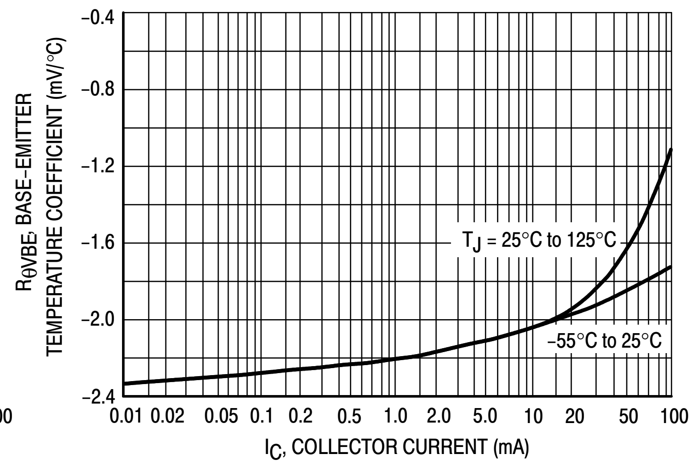


Figure 10. Temperature Coefficients

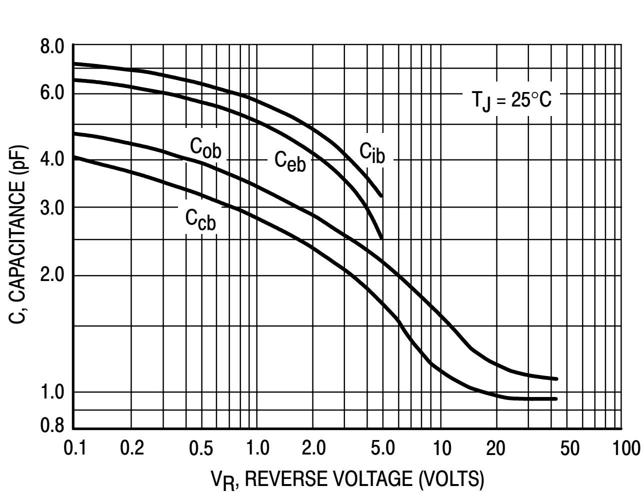


Figure 11. Capacitance

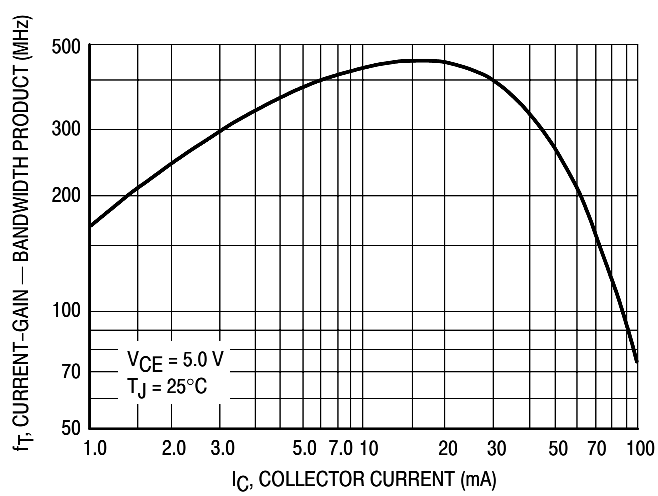
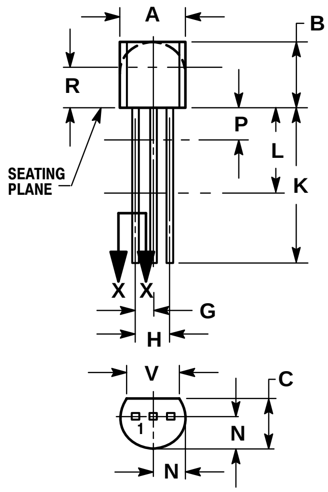
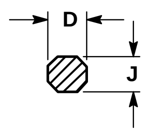


Figure 12. Current−Gain — Bandwidth Product

PACKAGE DIMENSIONS

TO–92 (TO–226)
CASE 29–11
ISSUE AL





SECTION X–X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

Notes

Notes

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